UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/577,471 | 04/27/2006 | Yuji Iwaki | 0756-7673 | 4788 |

31780 7590 01/14/2010

ERIC ROBINSON
PMB 955
21010 SOUTHBANK ST.
POTOMAC FALLS, VA 20165

| EXAMINER | |
|---|---|
| WILSON, MICHAEL H | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1794 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 01/14/2010 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/577,471 | IWAKI ET AL. | |
| | Examiner | Art Unit | |
| | MICHAEL WILSON | 1794 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *09 November 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-9,13-21 and 25-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,13-21 and 25-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20091109*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 09 November 2009 has been entered.

### *Response to Amendment*

2. This Office action is in response to Applicant's amendment filed 09 November 2009, which cancels claims 11, 12, and 22-24, amends claims 1-9, 13-15, 20, and 21, and adds new claims 27-29.

Claims 1-9, 13-21, and 25-29 are pending.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-3, 5, 6, 8, 9, 13-15, 17, 18, 20, 21, 25, 26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (US 2003/0218418 A9) in view of Seo et al. (US 2002/0086180 A1) and Shiratsuchi et al. (US 6,084,176).

Regarding claims 1-3, 5, 6, 8, 9, 13-15, 17, 18, 20, 21, and 28, Sato et al. disclose a light-emitting element comprising a first and second electrode [0031], a light-emitting layer between the electrodes [0031], and a layer hole transporting layer [0172]. Additionally the reference discloses the hole transporting layer ensures high efficiency in hole injection from the anode and efficient transportation of hole to the light-emitting layer [0172]. Compounds such as 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, aromatic amine compounds having a star burst structure, and spiro compounds such as 2,2',7,7'-tetrakis(diphenylamino)-9,9'-spirobifluorene are disclosed as suitable for the hole transport layer. The reference also discloses metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide as able to facilitate hole injection from the anode with high hole mobility ([0211]-[0212]). A layer of metal oxide on the anode is disclosed to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211]. However the reference does not explicitly

disclose a carbazole compound with a transition metal oxide in the hole transporting layer.

Seo et al. teach a similar organic electroluminescent device (abstract). The reference teaches combining the hole injection and transport layers into a single mixed layer [0033]. By combining the layers the reference teaches an energy barrier can be reduced lowering drive voltage and increasing service life of the device ([0032]-[0034]).

It would be obvious to one of ordinary skill in the art at the time of the invention combine the hole transport and injection layers, as taught by of Seo et al., in the device of Sato et al. One of ordinary skill in the art would reasonably expect such a layer to be suitable given that Seo et al. and Sato et al. both teach similar phosphorescent organic electroluminescent devices. Additionally Sato et al. teach that material used for the hole transporting layer needs a small ionization potential, high hole mobility, and excellent stability [0172], which are properties Sato et al. discloses metal oxides to have ([0211]-[0212]). Vanadium oxide, ruthenium oxide, and molybdenum oxide are also disclosed to efficiently inject holes from the anode and transport the holes to subsequent layers, which is disclosed as the function of the hole transport layer [0172]. One of ordinary skill in the art would reasonably expect that *adding* oxides of vanadium, ruthenium, or molybdenum to the hole transport layer would not destroy the function of the layer given that Sato et al. clearly discloses the metal oxides to posses properties desirable for the hole transport layer. One of ordinary skill in the art would be motivated by a desire to improve adhesion (Sato et al. [0211]), lower the drive voltage, suppress the voltage elevation on continuous driving, and increase the service life of the device.

Shiratsuchi et al. teach carbazole compounds of instant general formulae (1), (2) with Ar of instant formula 2-1 (compound H-23, column 23), and (3) (compound H-38 column 29) with instant Ar 3-1 (compounds H-24, column 23) and as suitable compounds for the hole transport layer (column 13, line 12 to column 14, line 5) used in a photoelectric device (column 2, lines 12-16). The reference also teaches carbazole compounds as equivalent with the hole transporting compounds of Sato et al. such as 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, aromatic amine compounds having a star burst structure, and tertiary amine containing fluorene compounds for use in the hole transport layer (column 13, line 12 to column 14, line 5).

In view of Shiratsuchi et al.'s recognition that carbazole compounds and hole transporting compounds of Sato et al. are equivalent and interchangeable, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the hole transporting compounds of Sato et al. with carbazole compounds such as H-23, H-24, or H-38 taught by Shiratsuchi et al. and thereby arrive at the present invention. Case law holds that the mere substitution of an equivalent (something equal in value or meaning, as taught by analogous prior art) is not an act of invention; where equivalency is known to the prior art, the substitution of one equivalent for another is not patentable. See *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claims 25 and 26, Sato et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a means for controlling light emission of the light-emitting element given that the voltage needed to obtain a specific

luminance is reported (table 3, page 46). Also the reference discloses an electronic appliance with a display portion comprised of a light emitting element [0261].

6. Claims 1, 4, 7-9, 13, 16, 19-21, 25, 26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (US 2003/0218418 A9) in view of Seo et al. (US 2002/0086180 A1) and Shirota et al. (US 5,487,953).

Regarding claims 1, 4, 7-9, 13, 16, 19-21, and 28, Sato et al. disclose a light-emitting element comprising a first and second electrode [0031], a light-emitting layer between the electrodes [0031], and a layer hole transporting layer [0172]. Additionally the reference discloses the hole transporting layer ensures high efficiency in hole injection from the anode and efficient transportation of hole to the light-emitting layer [0172]. Compounds such as 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, aromatic amine compounds having a star burst structure, and spiro compounds such as 2,2',7,7'-tetrakis(diphenylamino)-9,9'-spirobifluorene are disclosed as suitable for the hole transport layer. The reference also discloses metal oxides such as vanadium oxide, ruthenium oxide, and molybdenum oxide as able to facilitate hole injection from the anode with high hole mobility ([0211]-[0212]). A layer of metal oxide on the anode is disclosed to lower initial driving voltage, suppress the voltage elevation on continuous driving, and improve adhesion [0211]. However the reference does not explicitly disclose a carbazole compound with a transition metal oxide in the hole transporting layer.

Seo et al. teach a similar organic electroluminescent device (abstract). The reference teaches combining the hole injection and transport layers into a single mixed layer [0033]. By combining the layers the reference teaches an energy barrier can be reduced lowering drive voltage and increasing service life of the device ([0032]-[0034]).

It would be obvious to one of ordinary skill in the art at the time of the invention combine the hole transport and injection layers, as taught by of Seo et al., in the device of Sato et al. One of ordinary skill in the art would reasonably expect such a layer to be suitable given that Seo et al. and Sato et al. both teach similar phosphorescent organic electroluminescent devices. Additionally Sato et al. teach that material used for the hole transporting layer needs a small ionization potential, high hole mobility, and excellent stability [0172], which are properties Sato et al. discloses metal oxides to have ([0211]-[0212]). Vanadium oxide, ruthenium oxide, and molybdenum oxide are also disclosed to efficiently inject holes from the anode and transport the holes to subsequent layers, which is disclosed as the function of the hole transport layer [0172]. One of ordinary skill in the art would reasonably expect that *adding* oxides of vanadium, ruthenium, or molybdenum to the hole transport layer would not destroy the function of the layer given that Sato et al. clearly discloses the metal oxides to posses properties desirable for the hole transport layer. One of ordinary skill in the art would be motivated by a desire to improve adhesion (Sato et al. [0211]), lower the drive voltage, suppress the voltage elevation on continuous driving, and increase the service life of the device.

Shirota et al. teach carbazole compounds of instant general formula (4) as suitable compounds for the hole transport layer (column 4, lines 38-41, compound 3)

used in a organic electroluminescent device (abstract). The reference teaches the compound to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the carbazole compounds of Shirota et al. with the device of modified Sato et al. One of ordinary skill in the art would reasonably expect the compounds of Shirota et al. to be suitable in the hole transport layer of modified Sato et al. given that the compound is taught as suitable for the hole transport layer of a similar electroluminescent device by Shirota et al. (column 4, lines 38-65). One of ordinary skill in the art would be motivated by a desire to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

Regarding claims 25 and 26, Sato et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a means for controlling light emission of the light-emitting element given that the voltage needed to obtain a specific luminance is reported (table 3, page 46). Also the reference discloses an electronic appliance with a display portion comprised of a light emitting element [0261].

7. Claims 1-3, 5, 6, 8, 9, 13-15, 17, 18, 20, 21, and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kido et al. (US 2005/0084712 A1) in view of Shiratsuchi et al. (US 6,084,176).

Regarding claims 1-3, 5, 6, 8, 9, 13-15, 17, 18, 20, 21, and 27-29, Kido et al. disclose a light-emitting element comprising a cathode and an anode with a mixed layer

comprising a metal oxide and organic compound [0064] and a layer containing a light emitting compound ([0064] and [0101]). The reference discloses wherein the mixed layer is a hole injection layer adjacent to the anode [0027]. The mixed layer comprises vanadium oxide or rhenium oxide [0031] and an organic compound such as $\alpha$-NPD [0100]. The reference also discloses the ratio of the materials as 4:1 (oxide: NPD) and the layer having as thickness of about 100 nm [0100]. However the reference does not explicitly disclose a carbazole compound in the mixed layer.

Shiratsuchi et al. teach carbazole compounds of instant general formulae (1), (2) with Ar of instant formula 2-1 (compound H-23, column 23), and (3) (compound H-38 column 29) with instant Ar 3-1 (compounds H-24, column 23) and as suitable compounds for the hole transport layer (column 13, line 12 to column 14, line 5) used in a photoelectric device (column 2, lines 12-16). The reference also teaches carbazole compounds as equivalent and interchangeable with hole transporting arylamine compounds of Kido et al. (column 13, line 12 to column 14, line 5).

In view of Shiratsuchi et al.'s recognition that the carbazole compounds and the hole transporting compounds of Kido et al. are equivalent and interchangeable, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the arylamine compounds of Kido et al. with carbazole compounds such as H-23, H-24, or H-38 taught by Shiratsuchi et al. and thereby arrive at the present invention. Case law holds that the mere substitution of an equivalent (something equal in value or meaning, as taught by analogous prior art) is not an act of invention; where

equivalency is known to the prior art, the substitution of one equivalent for another is not patentable. See *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claims 25 and 26, modified Kido et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a means for controlling light emission of the light-emitting element given that the voltage needed to obtain a specific luminance is reported (figure 26 and [0118]). The reference also discloses the device to be suitable for a display device which is an electronic appliance with a display portion comprised of a light emitting element [0001].

8. Claims 1, 4, 7-9, 13, 16, 19-21, and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kido et al. (US 2005/0084712 A1) in view of Shirota et al. (US 5,487,953).

Regarding claims 1, 4, 7-9, 13, 16, 19-21, and 27-29, Kido et al. disclose a light-emitting element comprising a cathode and an anode with a mixed layer comprising a metal oxide and organic compound [0064] and a layer containing a light emitting compound ([0064] and [0101]). The reference discloses wherein the mixed layer is a hole injection layer adjacent to the anode [0027]. The mixed layer comprises vanadium oxide or rhenium oxide [0031] and an organic compound such as $\alpha$-NPD [0100]. The reference also discloses the ratio of the materials as 4:1 (oxide: NPD) and the layer having as thickness of about 100 nm [0100]. However the reference does not explicitly disclose a carbazole compound in the mixed layer.

Shirota et al. teach carbazole compounds of instant general formula (4) as suitable compounds for the hole transport layer (column 4, lines 38-41, compound 3) used in a organic electroluminescent device (abstract). The reference teaches the compound to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the carbazole compounds of Shirota et al. with the device of Kido et al. One of ordinary skill in the art would reasonably expect the compounds of Shirota et al. to be suitable in the mixed layer of Kido et al. given that the compound is taught as suitable for transporting holes in similar electroluminescent devices by Shirota et al. (column 4, lines 38-65). One of ordinary skill in the art would be motivated by a desire to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

Regarding claims 25 and 26, modified Kido et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a means for controlling light emission of the light-emitting element given that the voltage needed to obtain a specific luminance is reported (figure 26 and [0118]). The reference also discloses the device to be suitable for a display device which is an electronic appliance with a display portion comprised of a light emitting element [0001].

9. Claims 1-3, 5, 6, 8, 9, 13-15, 17, 18, 20, 21, and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (WO 2005/031798 A2) in view of Shiratsuchi et al. (US 6,084,176).

Regarding claims 1-3, 5, 6, 8, 9, 13-15, 17, 18, 20, 21, and 27-29, Ikeda et al. disclose a light-emitting element comprising a cathode and an anode with a mixed layer comprising a metal oxide and organic compound (page 2, lines 18-22) and a layer containing a light emitting compound (page 3, line 24 to page 4, line 2 and page 14, lines 6-8). The reference discloses wherein the mixed layer is a hole injection layer adjacent to the anode (page 13, line 22 to page 14, line 3). The mixed layer comprises molybdenum oxide, vanadium oxide ruthenium, tungsten oxide, or rhenium oxide (page 3 lines 6-10) and an organic compound such as $\alpha$-NPD (page 3, lines 11-18). The reference also discloses the ratio of the materials as 0.245:1(oxide: NPD) and the layer having a thickness of 130 nm (page 13, line 22 to page 14, line 3). However the reference does not explicitly disclose a carbazole compound in the mixed layer.

Shiratsuchi et al. teach carbazole compounds of instant general formulae (1), (2) with Ar of instant formula 2-1 (compound H-23, column 23), and (3) (compound H-38 column 29) with instant Ar 3-1 (compounds H-24, column 23) and as suitable compounds for the hole transport layer (column 13, line 12 to column 14, line 5) used in a photoelectric device (column 2, lines 12-16). The reference also teaches carbazole compounds as equivalent and interchangeable with hole transporting arylamine compounds of Ikeda et al. (column 13, line 12 to column 14, line 5).

In view of Shiratsuchi et al.'s recognition that the carbazole compounds and the hole transporting compounds of Ikeda et al. are equivalent and interchangeable, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the arylamine compounds of Ikeda et al. with carbazole compounds such as H-23, H-24, or H-38 taught by Shiratsuchi et al. and thereby arrive at the present invention. Case law holds that the mere substitution of an equivalent (something equal in value or meaning, as taught by analogous prior art) is not an act of invention; where equivalency is known to the prior art, the substitution of one equivalent for another is not patentable. See *In re Ruff* 118 USPQ 343 (CCPA 1958).

Regarding claims 25 and 26, modified Ikeda et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a means for controlling light emission (page 23, lines 2-12) and an electronic appliance with a display portion comprised of a light emitting element (page 23, lines 13-19).

10. Claims 1, 4, 7-9, 13, 16, 19-21, and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (WO 2005/031798 A2) in view of Shirota et al. (US 5,487,953).

Regarding claims 1, 4, 7-9, 13, 16, 19-21, and 27-29, Ikeda et al. disclose a light-emitting element comprising a cathode and an anode with a mixed layer comprising a metal oxide and organic compound (page 2, lines 18-22) and a layer containing a light emitting compound (page 3, line 24 to page 4, line 2 and page 14, lines 6-8). The reference discloses wherein the mixed layer is a hole injection layer adjacent to the

anode (page 13, line 22 to page 14, line 3). The mixed layer comprises molybdenum oxide, vanadium oxide ruthenium, tungsten oxide, or rhenium oxide (page 3 lines 6-10) and an organic compound such as $\alpha$-NPD (page 3, lines 11-18). The reference also discloses the ratio of the materials as 0.245:1(oxide: NPD) and the layer having a thickness of 130 nm (page 13, line 22 to page 14, line 3). However the reference does not explicitly disclose a carbazole compound in the mixed layer.

Shirota et al. teach carbazole compounds of instant general formula (4) as suitable compounds for the hole transport layer (column 4, lines 38-41, compound 3) used in a organic electroluminescent device (abstract). The reference teaches the compound to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the carbazole compounds of Shirota et al. with the device of Ikeda et al. One of ordinary skill in the art would reasonably expect the compounds of Shirota et al. to be suitable in the mixed layer of Ikeda et al. given that the compound is taught as suitable for transporting holes in similar electroluminescent devices by Shirota et al. (column 4, lines 38-4). One of ordinary skill in the art would be motivated by a desire to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

Regarding claims 25 and 26, modified Ikeda et al. disclose all the claim limitations as set forth above. Additionally the reference discloses a means for

controlling light emission (page 23, lines 2-12) and an electronic appliance with a display portion comprised of a light emitting element (page 23, lines 13-19).

***Double Patenting***

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and In *re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. Claims 1-3, 5, 6, 8, 9, 13-15, 17, 18, 20, 21, and 25-29 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 30-42 and 50 of copending Application No. 10/571,891 in view of Shiratsuchi et al. (US 6,084,176).

While the claims are not identical there is significant overlap in the claims. Application No. 10/571,891 teaches a light-emitting element comprising a light emitting layer and a mixed layer of molybdenum oxide and an aromatic amine compound

between a pair of electrodes (copending claim 30). The mixed layer is adjacent to the anode (copending claim 35). The copending application also teaches an electronic appliance comprising the light-emitting element, such as a person computer, a television, or a navigation system (copending claim 50). These appliances necessarily comprise a display portion and a means for controlling light emission of the light-emitting element. However the copending application does not explicitly teach a carbazole compound as the arylamine compound.

Shiratsuchi et al. teach carbazole compounds of instant general formulae (1), (2) with Ar of instant formula 2-1 (compound H-23, column 23), and (3) (compound H-38 column 29) with instant Ar 3-1 (compounds H-24, column 23) and as suitable compounds for the hole transport layer (column 13, line 12 to column 14, line 5) used in a photoelectric device (column 2, lines 12-16). The reference also teaches the carbazole compounds as equivalent and interchangeable with the hole transporting arylamine compounds of copending application (column 13, line 12 to column 14, line 5).

In view of Shiratsuchi et al.'s recognition that the carbazole compounds and the hole transporting compounds of copending application are equivalent and interchangeable, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the arylamine compounds of copending application with carbazole compounds such as H-23, H-24, or H-38 taught by Shiratsuchi et al. and thereby arrive at the present invention. Case law holds that the mere substitution of an equivalent (something equal in value or meaning, as taught by analogous prior art) is

not an act of invention; where equivalency is known to the prior art, the substitution of one equivalent for another is not patentable. See *In re Ruff* 118 USPQ 343 (CCPA 1958).

Applicants' attention is drawn to MPEP 804 where it is disclosed that "the specification can always be used as a dictionary to learn the meaning of a term in a patent claim." *In re Boylan*, 392 F.2d 1017, 157 USPQ 370 (CCPA 1968). Further, those portions of the specification which provide support for the patent claims may also be examined and considered when addressing the issue of whether a claim in an application defines an obvious variation of an invention claimed in the patent. (underlining added by examiner for emphasis) *In re Vogel*, 422 F.2d 438,164 USPQ 619,622 (CCPA 1970). Consistent with the above underlined portion of the MPEP citation, attention is drawn to paragraphs [0058]-[0061] which clearly teach one of ordinary skill in the art to use a ratio of 0.245:1(oxide: NPD) and a thickness of 130 nm for the mixed layer.

Therefore, given the overlap between the present claims and the copending claims, it would have been within the skill level of, as well as obvious to, one of ordinary skill in the art to use the device which is both disclosed by copending Application No. 10/571,891 and encompassed by the scope of the present claims in view of Shiratsuchi et al. (US 6,084,176) and thereby arrive at the present invention.

This is a provisional obviousness-type double patenting rejection.

13. Claims 1-3, 5, 6, 8, 9, 13-15, 17, 18, 20, 21, and 25-29 are directed to an invention not patentably distinct from claims 30-42 and 50 of commonly assigned Application No. 10/571,891. Specifically, see above.

The U.S. Patent and Trademark Office normally will not institute an interference between applications or a patent and an application of common ownership (see MPEP Chapter 2300). Commonly assigned Application No. 10/571,891, discussed above, would form the basis for a rejection of the noted claims under 35 U.S.C. 103(a) if the commonly assigned case qualifies as prior art under 35 U.S.C. 102(e), (f) or (g) and the conflicting inventions were not commonly owned at the time the invention in this application was made. In order for the examiner to resolve this issue, the assignee can, under 35 U.S.C. 103(c) and 37 CFR 1.78(c), either show that the conflicting inventions were commonly owned at the time the invention in this application was made, or name the prior inventor of the conflicting subject matter.

A showing that the inventions were commonly owned at the time the invention in this application was made will preclude a rejection under 35 U.S.C. 103(a) based upon the commonly assigned case as a reference under 35 U.S.C. 102(f) or (g), or 35 U.S.C. 102(e) for applications pending on or after December 10, 2004.

14. Claims 1-3, 5, 6, 8, 9, 13-15, 17, 18, 20, 21, and 25-29 are provisionally rejected under 35 U.S.C. 103(a) as being obvious over copending Application No. 10/571,891 which has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the copending application, it would constitute prior art under

35 U.S.C. 102(e) if published or patented. This provisional rejection under 35 U.S.C. 103(a) is based upon a presumption of future publication or patenting of the conflicting application. Specifically, see above.

This provisional rejection might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the copending application was derived from the inventor of this application and is thus not the invention "by another," or by a showing of a date of invention for the instant application prior to the effective U.S. filing date of the copending application under 37 CFR 1.131. This rejection might also be overcome by showing that the copending application is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

15. Claims 1, 4, 7-9, 13, 16, 19-21, and 25-29 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 30-42 and 50 of copending Application No. 10/571,891 in view of Shirota et al. (US 5,487,953).

While the claims are not identical there is significant overlap in the claims. Application No. 10/571,891 teaches a light-emitting element comprising a light emitting layer and a mixed layer of molybdenum oxide and an aromatic amine compound between a pair of electrodes (copending claim 30). The mixed layer is adjacent to the anode (copending claim 35). The copending application also teaches an electronic appliance comprising the light-emitting element, such as a person computer, a

television, or a navigation system (copending claim 50). These appliances necessarily comprise a display portion and a means for controlling light emission of the light-emitting element. However the copending application does not explicitly teach a carbazole compound as the arylamine compound.

Shirota et al. teach carbazole compounds of instant general formula (4) as suitable compounds for the hole transport layer (column 4, lines 38-41, compound 3) used in a organic electroluminescent device (abstract). The reference teaches the compound to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

It would be obvious to one of ordinary skill in the art at the time of the invention to combine the carbazole compounds of Shirota et al. with the device of copending application. One of ordinary skill in the art would reasonably expect the compounds of Shirota et al. to be suitable in the mixed layer of copending application given that the compound is taught as suitable for transporting holes in similar electroluminescent devices by Shirota et al. (column 4, lines 38-65). One of ordinary skill in the art would be motivated by a desire to have high heat resistance capable enable high luminance with a high efficiency for a long time (column 1, lines 57-60).

Applicants' attention is drawn to MPEP 804 where it is disclosed that "the specification can always be used as a dictionary to learn the meaning of a term in a patent claim." *In re Boylan*, 392 F.2d 1017, 157 USPQ 370 (CCPA 1968). Further, those portions of the specification which provide support for the patent claims may also be examined and considered when addressing the issue of whether a claim in an

application defines an obvious variation of an invention claimed in the patent. (underlining added by examiner for emphasis) *In re Vogel*, 422 F.2d 438,164 USPQ 619,622 (CCPA 1970). Consistent with the above underlined portion of the MPEP citation, attention is drawn to paragraphs [0058]-[0061] which clearly teach one of ordinary skill in the art to use a ratio of 0.245:1(oxide: NPD) and a thickness of 130 nm for the mixed layer.

Therefore, given the overlap between the present claims and the copending claims, it would have been within the skill level of, as well as obvious to, one of ordinary skill in the art to use the device which is both disclosed by copending Application No. 10/571,891 and encompassed by the scope of the present claims in view of Shirota et al. (US 5,487,953) and thereby arrive at the present invention.

This is a provisional obviousness-type double patenting rejection.

16. Claims 1, 4, 7-9, 13, 16, 19-21, and 25-29 are directed to an invention not patentably distinct from claims 30-42 and 50 of commonly assigned Application No. 10/571,891. Specifically, see above.

The U.S. Patent and Trademark Office normally will not institute an interference between applications or a patent and an application of common ownership (see MPEP Chapter 2300). Commonly assigned Application No. 10/571,891., discussed above, would form the basis for a rejection of the noted claims under 35 U.S.C. 103(a) if the commonly assigned case qualifies as prior art under 35 U.S.C. 102(e), (f) or (g) and the conflicting inventions were not commonly owned at the time the invention in this

application was made. In order for the examiner to resolve this issue, the assignee can, under 35 U.S.C. 103(c) and 37 CFR 1.78(c), either show that the conflicting inventions were commonly owned at the time the invention in this application was made, or name the prior inventor of the conflicting subject matter.

A showing that the inventions were commonly owned at the time the invention in this application was made will preclude a rejection under 35 U.S.C. 103(a) based upon the commonly assigned case as a reference under 35 U.S.C. 102(f) or (g), or 35 U.S.C. 102(e) for applications pending on or after December 10, 2004.

17. Claims 1, 4, 7-9, 13, 16, 19-21, and 25-29 are provisionally rejected under 35 U.S.C. 103(a) as being obvious over copending Application No. 10/571,891 which has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the copending application, it would constitute prior art under 35 U.S.C. 102(e) if published or patented. This provisional rejection under 35 U.S.C. 103(a) is based upon a presumption of future publication or patenting of the conflicting application. Specifically, see above.

This provisional rejection might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the copending application was derived from the inventor of this application and is thus not the invention "by another," or by a showing of a date of invention for the instant application prior to the effective U.S. filing date of the copending application under 37 CFR 1.131. This rejection might also be overcome by showing that the copending application is disqualified under 35 U.S.C.

103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

### *Response to Arguments*

18. Applicant's arguments filed 09 November 2009 have been fully considered but they are not persuasive.

Applicants argue that simply because the material of the anode buffer layer (metal oxide) and the HTL (organic complex) share some similar properties, they do not share all properties. A showing of some similar properties, applicant asserts, is insufficient to show that the materials are interchangeable, particularly here where the materials are significantly different. However the examiner does not argue that metal oxides and arylamine compounds are equivalent and interchangeable but that metal oxides posses the properties cited by Sato et al. as the critical properties for a material used in the hole transporting layer and therefore one of ordinary skill in the art would reasonably expect combining the metal oxides taught by Sato et al. into the hole transport layer would not destroy the function of the layer but produce a mixed layer with properties of the hole injection and hole transporting layers taught by Sato et al. One of ordinary skill in the art would reasonably expect the advantageous affects of having a hole injection layer taught by Sato et al. to be retained in the mixed layer because these effects come from the hole injection material which has been added to the hole transporting layer.

Applicants also argue that chemical arts are inherently unpredictable. Against this tenet, applicants assert, it is not at all clear that combining the anode buffer layer and the HTL, which are disclosed in Sato as separate and distinct elements, would have a reasonable expectation of success. Taking the assertions in the previous Official Action on their face, applicants assert, that the disclosed metal oxides of the anode buffer layer "meet the requirements of a suitable hole transporting material" would suggest to one of ordinary skill to merely replace the HTL with the anode buffer material. Such a modification, applicants argue, would destroy the functionality of the device since the resulting layer would require a thickness that would allow for sufficient carrier recombination to emit light. Therefore, applicants conclude, the materials and layers disclosed in Sato are critical to the functioning of the Sato device, which is contrary to the modifications proposed in the previous Official Action. However while use of a hole injection layer without a separate hole transport layer is known in the art, the examiner is not arguing that arylamine compound be *replaced* by metal oxides. As explained in the previous paragraph Sato et al. gives one of ordinary skill in the art reason to expect that combining a hole injection layer of metal oxide with the hole transport layer would be suitable because the metal oxides taught by Sato et al. for the hole injection layer are also taught to posses the properties needed for a hole transport material. Seo et al. gives one of ordinary skill in the art further reason to mix the layers by teaching mixed hole injection and transporting layers lower drive voltage and improve service life by lowering an energy barrier in the device.

Regarding the general assertion that chemical arts are inherently unpredictable, this argument is contrary to the basic foundational principle of science. While the examiner recognizes there are areas within the chemical arts which are unpredictable, the foundational principle of science and chemistry is that the universe and chemicals are rational and behaves in a rational manner. To be inherently unpredictable chemistry would have to be irrational (i.e. random). The basic goal of chemistry is to understand chemical behavior and the factors which affect them with the purpose of predicting and controlling chemical behavior. One needs only to look at the periodic table of elements to see that chemistry is predictable. The periodic table of elements is often used to predict chemical behavior. Further the laws of thermodynamics also demonstrate the predictability of chemical arts. Unpredictability in the chemical arts comes from the lack of understanding of the chemical system in question. As the knowledge and understanding in a chemical art increases the chemical systems involved become more predictable. Further the present claims rely on the predictability of the chemical arts. Claim 1 recites several metal oxides and a generic chemical formula. General formula (1) depends on the various compounds within its defined genus to posses predictably similar properties for the claim to be enabled. The metal oxides recited in the claim also rely on the predictability of the compounds to meet the enablement requirement. If either the recited metal oxides or general formula (1) is unpredictable one of ordinary skill in the art would be unable to make and use the invention commensurate with the scope of the present claims.

Applicants argue that Sato and Shiratsuchi or Shirota, either alone or in combination, do not teach or suggest the features (desirable *properties* cited in pages 21-23 of the Remarks) and advantages of the present invention. However the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

## ***Conclusion***

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL WILSON whose telephone number is (571) 270-3882. The examiner can normally be reached on Monday-Thursday, 7:30-5:00PM EST, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

20. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1794

MHW